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PropTech in the short-term rental industry. The digital infrastructure behind Airbnb

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ABSTRACT

Short-term rentals (STRs) have become a key topic in housing and urban studies, typically through accounts that focus on the role of platforms and portray Airbnb as the main driver of technological disruption and market transformation. This paper challenges that narrative by situating Airbnb within the broader history of digitalisation in the hospitality industry. Drawing on participant observation at three industry events and 18 semi-structured interviews with market actors, we trace the evolution of STR digitalisation from early online distribution systems to the integrated software ecosystems of today. Adopting an infrastructural perspective, the analysis conceptualises STR markets as organised through an interconnected assemblage of platforms, property management systems, channel managers, pricing algorithms, and analytics software, all of which are linked *via* APIs. This PropTech infrastructure operates as an obligatory passage point for professional market actors, shaping access to demand, enabling multi-channel distribution, and producing continuous streams of operational data. Control over this infrastructure becomes a source of market power by enabling the aggregation and repurposing of operational data for market analysis and asset valuation. This helps to extend financial logics into housing and intensify the touristification of places.

KEYWORDS: Digital platforms; data; housing financialisation; hospitality; hotels; Online Travel Agencies

Introduction

Over the past decade, short-term rentals (STRs) have become a key topic in housing and urban studies, particularly in analyses of Airbnb as a paradigmatic digital platform. Much of this scholarship perpetuates a platform-centric narrative, portraying Airbnb as the singular driver of technological disruption and market transformation (Guttentag, 2015; Oskam & Boswijk, 2016; Schor, 2020). In this paper, we instead offer a

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historical re-reading of STR digitalisation that situates Airbnb within a much longer trajectory of technological development rooted in the hospitality sector. As early as the 1960s, airlines and hotels began integrating information technologies, most notably through Global Distribution Systems (GDS), which enabled real-time coordination of bookings and availability (Buhalis & Law, 2008). This early digitalisation paved the way for Online Travel Agencies (OTAs) such as Expedia—founded by Microsoft in the mid-1990s—and for the widespread use of Property Management Systems (PMSs) in hotels to coordinate reservations, billing, and operations.

It is within this digitalised hospitality landscape that STRs emerged, progressively moving online in the 1990s and early 2000s through platforms such as VRBO and HomeAway, as well as through software tools adapted from the hotel industry. From this perspective, we suggest that Airbnb's success does not rest on creating the sector from scratch or exercising unilateral control, but on its capacity to innovate and integrate strategically into the broader digital infrastructure that has been taking shape since the late 1990s and continues to organise the circulation of STR supply across platforms.

Against this background, the paper asks how the STR market has been reorganised through an evolving digital infrastructure. In doing so, it makes three contributions to platform and PropTech scholarship: Firstly, it provides a *longue durée* reconstruction of the digitalisation of STRs, moving beyond platform-centric accounts that focus on Airbnb. Secondly, it theorises the STR market as an infrastructural assemblage organised through APIs, PMSs, and multi-channel distribution systems. Thirdly, it demonstrates how control over this data-generating infrastructure underpins new forms of market power and housing assetisation. Empirically, the paper draws on participant observation at three industry events, 18 semi-structured interviews with market actors, and secondary materials produced by industry players to trace the historical evolution of STR digitalisation from the early days of online distribution systems to today's integrated software ecosystems.

To interpret these developments, the paper draws on scholarship associated with the infrastructural turn in platform studies (Helmond et al., 2019; Plantin et al., 2018; Plantin & Punathambekar, 2019; van Dijck, 2021; van Dijck et al., 2019). This perspective shifts the analytical lens from platform centrality to infrastructural embeddedness. We define the STR digital infrastructure as the interconnected assemblage of platforms and software systems that collectively enable the circulation, coordination, and monetisation of STRs *via* API-based integration. This includes PMSs, channel managers, OTAs, as well as pricing tools and analytics software. We argue that this assemblage of networked tools acquires infrastructural qualities because it conditions the very possibility of market participation: visibility across platforms, multi-channel distribution and operating at scale increasingly depend on integration into this infrastructure rather than on reliance on any single platform. In this sense, the STR digital infrastructure operates as an obligatory passage point that structures how market actors can

access demand, distribute supply, and extract value. Our core argument is that Airbnb is better understood as one node within a wider digital infrastructure, rather than the pinnacle of platform power.

This argument also engages with emerging PropTech literature on rental housing (Fields & Rogers, 2021; Nethercote, 2023; Rogers et al., 2024; Shaw, 2020; Wainwright, 2023). While this scholarship has demonstrated the transformative impact of digital technologies on the real estate sector, STRs have thus far remained relatively marginal in these discussions, despite their long-standing role as laboratories for technological adoption. We contend that many of the tools now integral to rental PropTech, including algorithmic pricing, portfolio-scale property management systems, API-based integration, and real-time performance analytics, were initially developed, tested, and normalised within the STR sector. Regarding this, the paper shows that STR software tools generate continuous streams of operational data that are increasingly central to investment strategies, as this data can be aggregated and repurposed for market analysis and asset valuation.

In the following section, we develop our conceptual framework by integrating scholarship on platform power and PropTech. We then outline the methodology, which examines an increasingly global industry rather than a single case, before tracing how the STR digital infrastructure has been assembled historically and how it reorganises market participation, data extraction and value capture across the sector.

Platform power and digital infrastructures

The notion of two-sided markets describes how platforms mediate between two or more user groups, most commonly buyers and sellers. Unlike one-sided markets, where firms transact directly with customers, platforms create multi-sided environments in which value depends on the simultaneous participation of different actors (Kenney & Zysman, 2020; Schor, 2020). Complementors—third-party products or services such as apps for iOS or games for PlayStation—play a central role in this process by adding value that attracts more users, generating network effects whereby growth on one side increases value on the other. Once a critical mass is reached, these effects become self-reinforcing, making dominant platforms difficult to dislodge, as new entrants must persuade both users and complementors to switch simultaneously (Plantin et al., 2018). This dynamic tends to produce monopolistic market structures in which a small number of platforms centralise control. Apple's App Store exemplifies this logic: as the sole gateway to iOS apps, Apple curates access and controls data flows, enabling it not only to shape markets but also to regulate third-party participation (van Dijck et al., 2019).

Scholars highlight that dominant platforms increasingly resemble infrastructures (Plantin et al., 2018). Platforms such as Google Search or Facebook perform infrastructural roles as they centralise power, creating

socio-technical dependencies akin to essential public services. Over time, monopolistic platforms can produce institutional dependencies for businesses and governments (Helmond et al., 2019). These authors show how Facebook's shift from a social networking site to a "platform-as-infrastructure" exemplifies this transformation, as it integrates with third-party websites, advertising systems, and apps, becoming a backbone of online communication and commerce. The notion of platforms as infrastructures emphasises their monopolistic dominance: platforms wield unprecedented power over markets, while societies become deeply reliant on these private systems.

The notion of platform power has also been applied to how platforms extract rents by controlling access to the markets they dominate. Sadowski (2020) conceptualises digital platforms as a new form of rentier capitalism: like landlords, platforms do not create value through production but capture value by controlling access to assets, infrastructure, or data. Similarly, Birch and Cochrane (2022) argue that the economic power of Big Tech is best understood not only in terms of scale or network effects, but through digital rentiership, whereby firms define the conditions of participation and impose rents on dependent users. This dynamic underpins processes of monopoly formation and has led some scholars to argue that digital capitalism increasingly resembles a form of techno-feudalism: a system where platforms act less like competitive firms and more like digital landlords, extracting tribute from users who cannot avoid dependence on their privately owned infrastructures (Sadowski, 2020; Törnberg, 2023).

While the notions of two-sided markets and infrastructural power help explain how dominant platforms consolidate control, it is important to recognise that not all markets operate in the same way. Apple, for instance, exemplifies a highly centralised and monopolistic model in which both users and complementors depend on a single firm. This configuration, however, cannot be generalised across all sectors. In housing and real estate, platform power rarely takes the form of a vertically integrated gatekeeper comparable to Apple's App Store. Instead, PropTech operates through a heterogeneous assemblage of platforms and software tools that collectively restructure market access, valuation, and management practices. As Shaw (2020) conceptualises through the notion of 'platform real estate', digital real estate technologies intervene not by replacing markets wholesale but by embedding calculative devices, dashboards, and data infrastructures into existing professional practices. Similarly, Fields and Rogers (2021) show that housing platforms function as digital layers that reorganise relations between landlords, tenants, managers, and investors. From this perspective, complementors in housing markets are not app developers tied to a single proprietary ecosystem, but a distributed set of software instruments—such as tenant-screening tools, pricing algorithms, maintenance platforms, and analytics systems—that together constitute a digital infrastructure.

This perspective aligns with van Dijck's (2021) and van Dijck et al.'s (2019) argument that the infrastructural power of platforms stems less from the dominance of any single company than from the networked relations that connect platforms, software providers, and market actors, bringing entire sectors under their collective control. Applying this infrastructural lens to STRs complicates the widespread depiction of Airbnb as a singular, monopolistic platform. Much of the literature has treated STRs as synonymous with Airbnb's business model, theorised as a two-sided market in which the platform mediates between guests and hosts framed as amateur property owners and extracts rents from each transaction. Instead, we argue that STRs are organised through a digital distribution ecosystem in which Airbnb operates as a key, but not exclusive, node. Although Airbnb undeniably disrupted the sector and played a decisive role in popularising STRs globally (Guttentag, 2015; Oskam & Boswijk, 2016), it did not emerge in a vacuum. Its strategies and modes of operation were shaped by the historical trajectory of earlier STR actors and OTAs, as well as by the parallel development of tech-enabled property managers and software tools—particularly PMSs and channel managers—originally derived from the hotel industry. At the same time, Airbnb introduced innovations that reconfigured user expectations and had lasting effects across the sector.

From this perspective, infrastructure in the STR sector does not reside in Airbnb alone, but in a networked assemblage of digital distribution and operational tools whose API-based interconnections make large-scale STR circulation possible. Following Plantin and colleagues' (2016, 2018) conceptualisation of platforms as infrastructural, these systems move beyond discrete marketplaces to function as shared sociotechnical arrangements characterised by ubiquity, reliability, and relative invisibility. They acquire infrastructural status because they condition the very possibility of market participation, becoming routinised, difficult to opt out of, and essential to the coordination of STR supply across the sector. In the empirical section, we show that Airbnb's trajectory is therefore not one of market creation or unilateral dominance, but of strategic alignment with a digital infrastructure that predated its emergence and continues to shape the organisation of STR markets today.

This recognition shifts the analytical lens from Airbnb as a self-contained monopoly to Airbnb as a key node within an evolving digital infrastructure. The infrastructure in question consists of digital platforms and software tools, which makes it essential to situate the discussion within the broader domain of PropTech.

Rental PropTech and the short-term rental digital infrastructure

PropTech is commonly defined as the application of digital technologies to the management, exchange, and valuation of real estate assets (Fields

& Rogers, 2021; Rogers et al., 2024; Shaw, 2020). In the context of rental housing, the literature has emphasised the digitalisation of the tenant lifecycle, including online search, tenant screening, rent collection, maintenance, and property management (Fields, 2022; Migozzi, 2024; Wainwright, 2023; White, 2024).

Importantly, a growing body of scholarship shows how PropTech is reconfiguring rental housing by transforming data into a central source of value (Maalsen et al., 2024; Rogers et al., 2024; Shaw, 2020). While property records and tenancy agreements have long structured real estate markets, what distinguishes the current moment is the large-scale aggregation and analysis of this information. Once digitalised, tenant data and transaction records are combined into extensive datasets that power predictive analytics capable of shaping market behaviour. This datafication renders housing increasingly calculable and tradable, aligning it more closely with the logics of finance than with the slower, fragmented practices of traditional property markets (Fields, 2022; Shaw, 2020). PropTech thus does not merely mediate landlord–tenant transactions but generates new forms of value from information itself (Maalsen et al., 2024), and this information plays a central role in turning rental housing into an investable asset class (Fields & Rogers, 2021). Scholars conceptualise this data-driven market as the rise of "technological property", whereby digital infrastructures, platforms, and datasets—like land and buildings—can be owned, controlled, and monetised (Rogers et al., 2024).

These processes are often presented as relatively recent innovations within long-term rental markets. However, such accounts risk overlooking the extent to which the technological logics now associated with rental PropTech were first developed within the STR sector (Gong, 2023; Göppinger et al., 2024). This was not merely a matter of early adoption, but a structural necessity: STRs operate in geographically distant markets, require constant coordination of availability and pricing, and, since the 1990s, have relied on digital interfaces to mediate between hosts and guests. As a result, drawing on practices from the hotel industry, STRs developed digital infrastructures in which booking, payment, pricing, reputation, and operational management were integrated into continuous software systems and platform-mediated processes. In this regard, STR infrastructures produce real-time, high-frequency performance data, and once captured, aggregated, and standardised through software systems, this data renders housing assets continuously calculable.

In this context, we suggest that the production of STR data is enacted not only through platforms such as Airbnb or Booking.com, but through a broader infrastructural layer composed of property management systems (PMSs), channel managers, revenue management software, and analytics tools. Crucially, control over these data-generating infrastructures constitutes a distinct form of power because it governs how market information is produced and made actionable in real time, thereby shaping pricing strategies and investment decision-making. With regard to control over

the infrastructure, research shows that data is increasingly captured by software providers and professional property managers, many of which are venture-backed start-ups that both develop and operate these systems (Cocola-Gant et al., 2021, White, 2026). At the same time, in this paper we will show that acquisitions of STR software firms by major real estate platforms illustrate how access to operational data has become a strategic objective, enabling actors to translate everyday rental practices into investment-oriented knowledge.

Finally, one of the most significant consequences of this data-driven infrastructure is the increasing liquidity of housing use. STR software systems enable properties to be listed simultaneously across multiple platforms and rental segments, including short-term, medium-term, and long-term markets (Dagkouli-Kyriakoglou et al., 2022; Gil et al., 2023). By integrating with different platform types through APIs, this infrastructural interoperability allows property owners and managers to continuously compare expected returns and reallocate dwellings towards the most profitable use, whether seasonally or in response to market fluctuations. This capacity to switch between rental regimes transforms housing into an option-like asset, whose value lies not only in current income streams but in the ability to respond flexibly to market volatility. For instance, after the Covid-19 pandemic, long-term rental platforms such as Zoopla in the UK and Idealista in Spain and Portugal have opened their APIs to STR software, accelerating the expansion of temporary housing (Dagkouli-Kyriakoglou et al., 2022). This trend underscores the need to integrate the PropTech literature with research on STRs, as rental practices derived from the hospitality sector are increasingly extended into longer-term housing markets, with significant implications for tenant precarity and housing instability (Dimitrakou, 2026; White, 2024).

Methodology

This research builds on a series of projects on STRs that we have been developing since 2015 (Cocola-Gant & Gago, 2021). In 2018, we began focusing specifically on the supply structure of STRs, conducting interviews with property managers. Many of these managers developed digital technologies for STR management and commercialisation, with several expanding through venture capital financing and establishing transnational brands (Cocola-Gant et al., 2021). In 2021, we launched a new project exploring the intersections of STRs, digital technology, and housing financialisation, from which this paper originates (Cocola-Gant et al., 2025).

Our analysis draws on three primary sources of information. First, we conducted participant observation at three industry events: the VITUR Summit in Málaga, Spain (October 2021); the European Short-Term Rentals Digital Conference (November 2021, online); and the Vacation Rental World Summit in Porto, Portugal (September 2022). These events were structured around company stands, and it is worth noting that most of which were

occupied by software developers and data intelligence providers. Another significant group consisted of OTAs and platforms, though notably Airbnb was absent from all three events. All three events also featured seminars and keynote presentations, typically delivered by industry leaders, consultants, and representatives of STR associations. The central themes included technological innovation, market analysis, investment opportunities, and regulatory frameworks. Participants were primarily property managers, individual hosts for whom STRs constitute a primary occupation, and investors.

Attending these events proved highly valuable, as they facilitated connections with a wide range of stakeholders and enabled the identification of key industry actors. Informal conversations at company stands provided useful insights into their products, while also serving as opportunities to establish initial contacts for subsequent in-depth interviews. In 2022, we conducted 18 semi-structured interviews with consultants, software developers, property managers, and representatives of the European Holiday Home Association (EHHA). These interviews focused particularly on the trajectory of STRs before and after Airbnb's emergence and on the ways digital technologies have reshaped the sector. Interviewees were selected through purposive sampling, with the aim of capturing actors occupying different positions within the STR digital infrastructure. Interviewees were chosen for their capacity to clarify the architecture, governance, and evolution of the STR digital infrastructure rather than for their geographical location.

A third source of information consisted of secondary materials produced by industry actors, including blogs, news, videos, and reports published by consultants and companies, as well as specialised magazines and newsletters, which are cited throughout the analysis. For the historical trajectory of STRs, it was particularly useful to draw on *The Definitive Oral History of Short-Term Rentals*, a series of interviews with industry professionals compiled by Schaal (2022a, 2022b).

These sources were triangulated analytically rather than treated as standalone datasets. Industry sources were used to reconstruct the historical trajectory of STR technologies and to document industry narratives and technical developments. Informal conversations at industry events served to contextualise and corroborate these materials, providing insights into everyday practices, industry norms, and emerging trends. Semi-structured interviews were used to deepen and validate these interpretations, allowing us to cross-check claims made in reports and informal discussions, and assess how different actors positioned themselves within the STR digital infrastructure. By combining these sources, we developed a diagram mapping the digital infrastructure of STRs. This draft diagram was subsequently used in interviews, where we applied elucidation techniques by inviting participants to comment on and refine the image. This approach proved valuable in clarifying and more precisely defining the composition of the digital infrastructure that we will present below.

From classified ads to Airbnb. The technological shift in short-term rentals

The concept of renting out vacation homes began decades before the widespread adoption of the internet. Second homeowners in popular vacation destinations quickly realised they could generate income by renting out their properties (Nicod et al., 2007). The challenges associated with logistics for distant owners led to the emergence of property managers. In Europe, the first property management company in the vacation rental sector was believed to be Interhome, which was founded in the Swiss Alps in 1965. Prior to Airbnb's creation, Interhome had become the largest European operator, managing 20,000 properties across several countries (www.interhome.com). In the US, the Vacation Rental Management Association (VRMA) was founded in 1985 (www.vrma.org). The VRMA emerged from a gathering of vacation rental professionals who wanted to establish a trade association for the industry and a collective voice to advocate for regulatory frameworks, probing the early consolidation of the sector.

Property management companies intermediated owners' access to rental income, but at a steep cost, often charging 40–50% of revenue in the 1980s (Schaal, 2022a). To avoid management fees, David Clouse, a computer programmer and ski condo owner in Colorado, began self-managing his property in the late 1980s, advertising in the classified sections of travel magazines. With the advent of the Internet, in 1995 he launched VRBO (Vacation Rentals By Owner), a platform featuring property listings and direct contact options for prospective guests. In this regard, a key point in this early history is the transformation of STRs from offline to online. In the pre-internet era, property owners and managers relied on print classified ads. In the mid-1990s, classified ads in printed magazines began to change with the rise of the internet. Apart from VRBO, other vacation rental listing sites emerged in the US, such as CyberRentals.com (Schaal, 2022a). This site evolved from a vacation rental magazine created in 1987 into a website in 1995.

Property managers began developing dedicated websites to showcase the full range of properties within their portfolios. For instance, Interhome launched its website in 1998 (www.interhome.com). In this context, the first start-up initiatives in the vacation rental industry largely functioned as website developers for property managers. A notable example in Spain is Avantio, founded in 2002, which by 2006 had already created more than 100 websites exclusively for STR property managers in the Spanish market (www.avantio.com). These developments resulted in two main types of websites: property management companies that transitioned their operations to the web, and listing sites like VRBO and others that aggregated properties from multiple owners and managers.

Importantly, these websites began accumulating the critical mass of listings and users that would later attract institutional investment, which

led to the creation of HomeAway in 2004. Initially backed by $50 million in venture capital, HomeAway aimed to consolidate and scale the STR market (HospitalityNet, 2009). To achieve this, HomeAway acquired many leading independent sites, including CyberRentals and, eventually, VRBO, thereby building a unified global platform. Thanks to different rounds of venture capital financing, HomeAway expanded internationally and by 2008, it was active in 118 countries, having a global portfolio of 360,000 listings (HospitalityNet, 2009). These listings were professionally managed and consisted of entire properties rented out to visitors, not rooms.

At the same time, Booking.com began experimenting with vacation rentals. The first apartment was listed in 2000, and by 2004 the platform offered vacation rentals across several countries (Donovan, 2021). Booking.com integrated vacation rentals directly into its existing hotel search results, positioning them as another accommodation type to diversify its inventory (Schaal, 2018). Similar to the HomeAway strategy, the company focused on partnerships with professional property managers who could guarantee hotel-like standards. This strategy narrowed its reach primarily to formal vacation rentals. In any case, it's clear that STRs was becoming more popular as an accommodation type before Airbnb was created.

Finally, it is important to note that although early online platforms made it easier to find vacation rentals, it took them longer to enable travellers to book those rentals directly online. Platforms such as VRBO and HomeAway, as well as property managers' websites, operated like digital classified ads, but payments and confirmations were manual. This model involved risk and uncertainty for travellers. Even so, as e-commerce matured in the early 2000s and travellers grew increasingly accustomed to booking flights and hotels online, consumer expectations evolved accordingly (Buhalis & Law, 2008). Established OTAs such as Expedia and Booking.com were already providing instant hotel reservations, thereby shaping norms for online travel transactions. Booking.com partially extended this functionality to vacation rentals; however, the platform delegated payment collection to hosts, requiring guests to pay directly either in advance or upon check-in (Masson, 2021). This arrangement created significant challenges for small-scale hosts, many of whom lacked access to merchant services or faced heightened risks related to fraudulent transactions. Consequently, participation in Booking.com's vacation rental market was largely limited to professional property managers with the resources to absorb these risks. By contrast, Airbnb was the first platform to fully integrate payment processing within the vacation rental sector (Guttentag, 2015). Its system managed credit card transactions on behalf of hosts and held payment until guest check-in, thereby enhancing trust and security for both hosts and guests. This capability distinguished Airbnb from Booking.com's early approach, making Airbnb's model particularly attractive to small-scale hosts who benefitted from the platform's end-to-end payment management. Therefore, FinTech innovations were key to explaining the rise of Airbnb-style STRs (Masson, 2021).

Before examining in detail the technological innovations introduced by Airbnb, the next section synthesises how online distribution developed in the early 2000s.

Online distribution in the pre-Airbnb era

Figure 1 summarises how STR distribution worked before the arrival of Airbnb. At the centre of the system were property managers, who acted as intermediaries between property owners and guests. They marketed rentals both through their own websites and through major platforms such as HomeAway, Booking.com, and other listing sites. Meanwhile, VRBO catered mainly to property owners who preferred to manage bookings themselves without relying on a property manager. At the top of the distribution chain was Google, where all players—property managers, platforms, and listing sites—competed for visibility by paying for cost-per-click advertising to capture guest searches.

As shown in Figure 1, even before the rise of Airbnb, STR operators relied on emerging digital infrastructures—such as listing websites, early property management systems, and search engine visibility—to access demand and coordinate bookings. These systems mediated market access, structured visibility, and introduced early forms of standardisation and dependence through online listings, calendar management, and search-based ranking. This historical reconstruction shows that Airbnb entered a

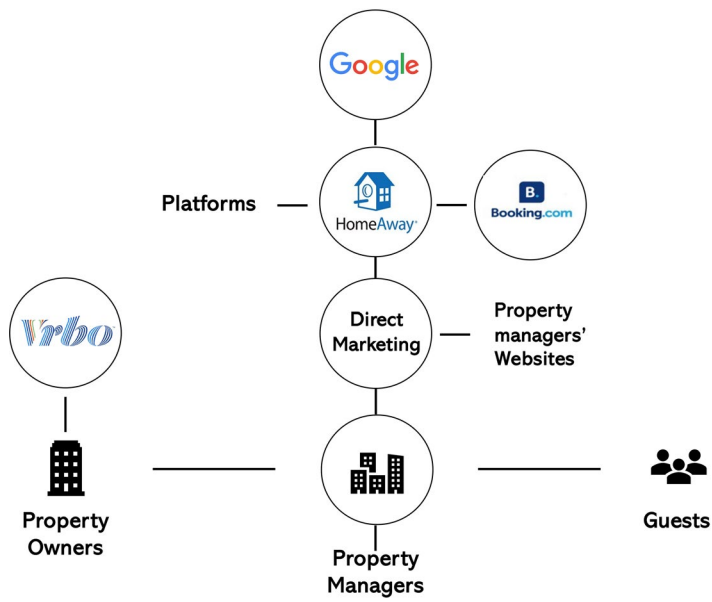

Figure 1. Online distribution in the pre-Airbnb era.
Source: own elaboration.

market already organised through layered digital infrastructures, rather than creating them from scratch.

Airbnb's strategy

The STR industry experienced its most profound transformation with the founding of Airbnb in 2008. Unlike earlier platforms, Airbnb was conceived from the outset as a fully transactional online marketplace rather than a listing site (Guttentag, 2015). Before Airbnb, availability calendars were often outdated, payments were typically made by check or wire transfer, and there were no standardised guarantees or review systems. Instead, Airbnb enabled guests to search for and browse properties, check real-time availability, make secure payments, and receive instant or near-instant booking confirmation, all without leaving the platform. Furthermore, a standardised, two-way review system allowed both guests and hosts to rate each other, fostering accountability and transparency. In sum, what set Airbnb apart was its deliberate use of digital technology to build a trust framework at the heart of its operations (Oskam & Boswijk, 2016). By making people feel safe, Airbnb unlocked new demand from guests and encouraged millions of new hosts to enter the market, fuelling the network effect that propelled its growth (Schor, 2020). Moreover, it expanded rapidly fuelled by massive venture capital backing. This allowed them to undercut the competition and quickly build a user base (Langley and Leyshon, 2017).

Additionally, Airbnb adopted a commission-based model similar to those of OTAs such as Expedia. STR websites, from VRBO to HomeAway, used a subscription model where owners and managers paid an annual fee to list their properties. According to one of our participants, in 2006 the HomeAway subscription was around $300 annually. The subscription-based model meant a high entry barrier that only professional operators could overcome. Rather than requiring an upfront annual fee, Airbnb charges a percentage on each booking. This approach eliminated the financial risk for new property owners because listing a property was free, which dramatically lowered entry barriers. This ease of entry was a key driver of the platform's exponential growth in listings and encouraged millions of new non-professional hosts to enter the market (Guttentag, 2015).

Finally, Airbnb offered an alternative to the traditional STR model, which primarily involved renting out entire properties. Airbnb created a new cultural phenomenon by making it easy for individuals with no hospitality experience to rent out part of their properties (Dogru et al., 2020). Their tools, marketing tone, and onboarding process were welcoming to non-professionals. This approach emerged during an economic crisis, enabling homeowners to earn extra income.

Airbnb's public image was built around the romanticised idea of ordinary people casually 'sharing' their homes (Celata et al., 2017; Schor, 2020). Yet the company was actually a highly sophisticated technology enterprise

that deliberately adopted innovations proven in the airline and hotel industries since the 1990s. These innovations include real-time availability, instant booking, secure payments, and automated customer service. Rather than disrupting the market with an entirely new economic model, Airbnb succeeded by applying advanced technological tools and hospitality industry best practices to the fragmented STR sector.

Beyond Airbnb: the digital infrastructure underpinning the short-term rental industry

While Airbnb is often credited with disrupting and popularising STRs, in this section we explore how the transformation of the sector has been shaped not only by Airbnb but also through its interaction with other platforms and the parallel development of software tools originally adapted from the hotel industry, particularly Property Management Systems (PMSs) and channel managers.

Channel managers and the emergence of multi-channel distribution

In the early days of OTAs such as Booking.com and Expedia, hotels had to manually log in to each OTA's extranet to update room rates and availability. This process was not only time-consuming but also prone to errors, often leading to overbookings. By 2000, as OTAs proliferated and became a dominant source of bookings, a new category of software emerged: channel managers (O'Connor & Frew, 2002). A channel manager is a tool that connects a property's reservation system to multiple OTAs, automatically synchronising rates, inventory, and bookings across all platforms in real time (O'Connor, 2016). Beyond reducing overbookings, channel managers can significantly increase revenues as they ensure that a property's rooms are visible and bookable on a wider range of OTAs simultaneously (Beritelli & Schegg, 2016).

For a channel manager to connect with an OTA, or with any other platform, the OTA must provide an application programming interface (API)—a set of technical protocols that allow the channel manager's system to 'talk' to the OTA's platform. Without an API, updates must be done manually through the OTA's extranet (Hollander, 2025). The development of OTA APIs was therefore a crucial step in enabling large-scale distribution through channel managers. Authors exploring 'platformization', such as Helmond (2015) and Plantin et al. (2018), highlight how the provision of APIs is key to building digital infrastructures in which platforms explicitly enable connections with third parties or complementors. Therefore, APIs are central instruments of infrastructural power and dependency that govern access and stability within markets.

In the early 2000s, professional vacation rental managers began adopting channel managers to distribute listings across multiple websites. ISILink,

developed by Instant Software and launched in 2005, served as a distribution database that connected vacation rental property data and availability to numerous sales channels, including global distribution systems (GDS) and OTAs (HotelExecutive, 2005). This represented a major step towards enabling vacation rentals to be booked more like hotels on global platforms. By the late-2000s, additional channel managers emerged. HomeAway's entry in 2004 further accelerated the development of channel management, and in 2010 HomeAway acquired Instant Software (and its ISILink system) to help property managers list their inventory on the platform (Schaal, 2022b). Importantly, this acquisition gave HomeAway access to a vast pool of operational data. In this way, control over Instant Software became a way for HomeAway to consolidate market power by capturing and leveraging the data that underpinned vacation rental distribution.

The use of vacation rental channel managers expanded significantly in the 2010s, following the exponential growth of the market (Magyar, 2021). Three points are worth highlighting. First, all major platforms adopted a commission-based model and allowed property owners and managers to create listings for free (Schaal, 2022b). This led to the rise of multi-channel distribution, a strategy in which STR property listings are published simultaneously on multiple platforms. As noted by other scholars (Giannoni et al., 2021), all property managers we interviewed reported using channel managers and confirmed that they list their properties on Airbnb, Booking.com, and Vrbo, as well as on various regional and niche platforms.

When Airbnb popularised STRs in the 2010s, OTAs quickly reinforced the presence of vacation rentals within their inventories (Schaal, 2022b). Expedia's 2015 acquisition of HomeAway—later rebranded as Vrbo—secured a dominant position in the US market and abandoned the initial VRBO model to also integrate property managers. In Europe, Booking.com strategically expanded into STRs, and in Asia, platforms such as OYO and Agoda pursued similar moves. Beyond the large OTAs, a proliferation of STR platforms emerged, often targeting specific regions or niche segments. For instance, Homes & Villas by Marriott positioned itself in the luxury travel market (informal interview at the Vacation Rental World Summit). At the same time, several STR property managers evolved into transnational brands, which have also invested in developing their own direct booking platforms (Cocola-Gant et al., 2021). Collectively, these developments have expanded the digital ecosystem for STR distribution and accelerated the widespread adoption of channel managers as a core infrastructure within the sector.

Second, the use of channel managers has expanded beyond professional property managers to individual owners, who suddenly gained access to multiple global platforms. This shift was enabled by the rise of cloud computing (Narayan, 2022) and the emergence of SaaS-based channel managers tailored to their needs. SaaS (Software as a Service) refers to software hosted in the cloud and made available to users over the internet

through a subscription model. Modern channel managers are almost universally delivered this way, with pricing typically based on the number of properties and the number of platforms connected (Magyar, 2021). For example, an individual owner in Europe with two properties can distribute them on Airbnb, Booking.com, and Vrbo for around €20 per month, while business professionals can access additional features and higher capacity through the same software at a higher fee.

Third, it is important to note that Airbnb developed tools to integrate professional players (Bosma & van Doorn, 2024). Although in its early days the company sought to differentiate itself from the traditional hospitality industry by promoting the idea of a new concept—'home sharing'—it eventually had to acknowledge that the bulk of its revenues came from property managers rather than from individuals renting out a spare room (Deboosere et al., 2019; Iacovone, 2023). Given that Airbnb's commission model is based on taking a percentage of each booking, higher volumes of bookings and higher-priced properties naturally translate into greater revenue for the platform. In this context, a one STR consultant explained to us:

> One must understand the value of a listing. What matters is not the sheer number of listings, but their value. It is irrelevant that Airbnb advertises six million listings if many are only rented occasionally or consist of low-priced rooms. The true value lies in entire properties that are consistently rented year-round, and these are predominantly supplied by professional property managers.

This aligns with research showing that while most hosts offer only a single listing, the revenue they generate is marginal (Iacovone, 2023, Cansoy & Schor, 2024). Understanding Airbnb's narrative requires recognising this point. The company emphasises that most hosts are non-professional individuals offering a single listing, a claim that is factually correct, and uses this to lobby for lenient STR regulations and to position itself as a platform that empowers 'ordinary people' (van Doorn, 2020; Yates, 2025). Yet the reality is that Airbnb cannot rely on the revenue generated by these small-scale hosts. Bosma and van Doorn (2024), drawing on Airbnb's internal documents, demonstrate that the company identified a strategic vulnerability in its limited initial support for professional property managers. Without adequate technological infrastructure and integration, Airbnb risked losing these hosts, who could reduce their contribution of listings and reallocate inventory to competing platforms. To mitigate this risk and secure continued access to professional supply, Airbnb pursued greater integration of property managers, including the public release of its API. In doing so, Airbnb was following a path similar to that of OTAs, which had been opening their APIs to integrate third-party providers since the early 2000s. This shift gradually took shape after 2013, when Airbnb asked hotel industry expert Chip Conley to join as Head of Hospitality (Schaal, 2022b). He was tasked with helping the company evolve into a hospitality business, which involved working with professional operators

and expanding its focus beyond low-cost rooms to include higher-quality accommodations. Furthermore, as a public company, Airbnb must continually expand its portfolio to sustain share price growth. In this context, it has announced plans to integrate hotels into its inventory from 2026 (Maharishi, 2025), thereby further consolidating its position as an OTA.

What this reveals is that the platform's long-term success rests on its ability to embed itself within the wider distribution ecosystem that has been shaping the hospitality industry since the early 2000s. OTAs and platforms like Airbnb function less as distinct categories and more as nodes in a global distribution network. In this regard, Airbnb should be understood as another distribution channel, on par with OTAs such as Booking.com and Expedia. All of the participants we interviewed emphasised this view, highlighting that in practice none relies solely on Airbnb, but instead distributes listings across multiple platforms to maximise revenue and visibility.

Property management systems and integrated software applications

There is broad agreement among participants that the rise of larger property managers and the increasing specialisation of STRs, now operated more like hotels, has driven demand for more sophisticated software solutions. On this trend, one STR consultant stated that 'nobody really talks about the huge flow of venture capital going into vacation rental software'. A report on software development for vacation rentals identified more than 450 start-ups worldwide offering STR management tools, of which 150 specialise in Property Management Systems (PMS) (AJL Atelier, 2023). In the hotel sector, a PMS centralises and automates operational processes within a property, supporting staff in tasks ranging from guest check-in and check-out to billing and housekeeping (Kokaz Pucciani & Murphy, 2011). Prior to digitalisation, hotels relied on manual systems to manage reservations. The introduction of PMSs emerged in the 1980s alongside the rise of personal computing (Phocuswire, 2018). As hotel chains expanded globally in the 1990s, PMS tools became increasingly standardised and widely implemented.

The STR industry followed a similar path. Listing platforms such as VRBO enabled managers to advertise properties, but these services did not integrate with operational tools, which remained manual. A property manager interviewed for this study recalled that in the 1990s their 'management system' consisted of a printed A1 calendar pinned to the wall. A turning point occurred in the mid-1990s, when vacation rental technology developers began borrowing functionality from hotel PMSs. In 1996, Instant Software was founded in the United States and is widely considered the first purpose-built PMS company for vacation rentals (Schaal, 2022b). The formation of Instant Software represented an early effort to standardise and digitise property management at scale.

Its growth was significant: by the end of 2004, more than 770 management companies were using Instant Software tools to manage nearly 200,000 vacation homes across several countries (Ryman, 2004). The professionalisation of PMSs accelerated when HomeAway purchased Instant Software in 2010 (Schaal, 2022b). This strategic move allowed HomeAway to control not only the marketplace side of the industry but also its operational infrastructure, gaining privileged access to the vast flow of data generated by property managers. Nevertheless, Instant Software's tools remained oriented towards professional operators rather than individual homeowners, as their complexity and cost limited accessibility to smaller hosts.

The rapid expansion of Airbnb transformed not only the guest experience but also the structure of supply. Apart from people renting occasionally a room in their home, many individual hosts became professionalised, managing a handful of properties as micro-entrepreneurs (Christensen, 2026; Stabrowski, 2017). This new cohort with no prior property management experience required user-friendly, affordable, and cloud-based tools to manage listings, calendars, and guest interactions. Similar to the evolution of channel managers, the new generation of PMSs that emerged in the early 2010s are SaaS tools offered under a subscription model. This makes them affordable for small suppliers while still being widely adopted by professional property managers (Barrero-Rescalvo & Díaz-Parra, 2024).

Integrated software tools

In today's STR industry, software has evolved into fully integrated applications. What once required separate systems, particularly channel managers for distribution and PMS for operations, has now been combined into all-in-one applications that allow hosts and property managers to control all tasks from a single dashboard (AJL Atelier, 2023). PMSs and channel managers represent the basic features of STR software, but a wide range of specialised software tools has emerged. Among the most widely used are dynamic pricing and revenue management systems, which automatically adjust nightly rates based on demand, seasonality, competitor activity, and local events (Abrate et al., 2022; Gibbs et al. 2018; Oskam et al., 2018). These tools help property managers maximise occupancy and revenue. What makes these tools crucial is that they also provide real-time market data. Revenue management systems, for example, do not just set prices, they gather and analyse competitor performance, booking trends, and consumer behaviour. This constant flow of market information is essential for property managers. For instance, Göppinger and colleagues (2024) show that in Madrid, property managers who used data intelligence tools achieved an 11.6% revenue increase compared to those who did not adopt such technologies. Real-time data do not merely support managerial decision-making, but they increasingly

function as obligatory passage points for remaining competitive in the STR market.

In addition to PMSs, channel managers, and revenue management systems, a wide range of new software categories has emerged. Gong (2023) identifies 23 distinct types of software applications. Among these, guest screening software has become particularly common, allowing managers to verify guest identities and assess risk profiles. Other integrated tools include smart lock systems for contactless check-in and various forms of home automation. These technologies not only streamline operations but also generate data on guest behaviour and consumption patterns. For guests, the vacation rental experience is entirely digital, encompassing everything from searching and booking properties to checking in.

It is important to mention that these professional software tools are far more advanced than the basic solutions provided directly by Airbnb. While Airbnb offers hosts features such as calendar management or pricing tools, these are limited to its own platform and lack the sophistication needed to manage operations across multiple channels. By contrast, independent software tools integrate reservations and pricing strategies from different OTAs. For this reason, even small hosts who manage just a few properties often adopt these third-party tools to operate more efficiently and reach a wider market (this was evident in informal interviews with small hosts conducted at industry events). In practice, it is primarily amateur hosts, who rent out their homes on an occasional basis, that rely exclusively on Airbnb's basic functions (Bosma & van Doorn, 2024).

Direct booking and metasearch

Finally, another significant innovation has been the development of website builders for vacation rentals, which allow property managers to create branded websites showcasing their full portfolio. This type of product has existed since the 1990s, but it has evolved significantly. Today, these websites integrate a booking engine, making it possible to accept direct reservations without going through platforms like Airbnb or Booking.com (Magyar, 2021). In this sense, large property managers have followed the model of hotels' reservation systems, reducing the commission fees paid to OTAs.

In relation to this, the STR industry has seen the growth of metasearch platforms such as Google Travel and Trivago. Unlike OTAs, which sell rooms directly, metasearches function as aggregators, displaying prices and availability from multiple channels so that travellers can compare options in real time. For property managers, being present on metasearch engines has become a key distribution strategy: it increases visibility, drives more traffic to their direct booking sites, and helps reduce dependency on dominant OTAs. In this way, website builders and metasearch platforms work together to give managers more independence and control.

The short-term rental digital infrastructure

As a synthesis of these developments, Figure 2 illustrates the digital infrastructure underpinning the modern STR sector. At the base of the figure, property managers appear as intermediaries. This category includes both corporate hosts and professional individual hosts who manage only a few properties as their main occupation. Both rely on software tools for management and distribution. These tools offer a wide range of functionalities, from website development to reservation systems for large property managers, which is why they are often integrated with metasearch engines. On the sales side, they link directly to major OTAs, including Airbnb.

While the figure highlights the main platforms, it should be noted that a large number of niche and regional platforms also operate within the ecosystem. For instance, some software tools can distribute listings across more than 60 platforms simultaneously (Magyar, 2021). These platforms are not limited to the STR market but extend to other segments, such as student housing and medium-term rentals. Furthermore, long-term rental platforms have opened their APIs to STR software (Dagkouli-Kyriakoglou et al., 2022), increasingly integrating different rental segments within the same management dashboard.

Finally, Airbnb is depicted twice in the figure: first, as embedded within the broader digital infrastructure, and second, as a standalone platform used by amateur hosts who operate without software tools or access to the wider ecosystem. Airbnb promotes this latter group as representative of the STR market, but evidence suggests a very different reality.

Figure 2 should not be read merely as a descriptive map of actors and technologies, but as a representation of an infrastructural configuration

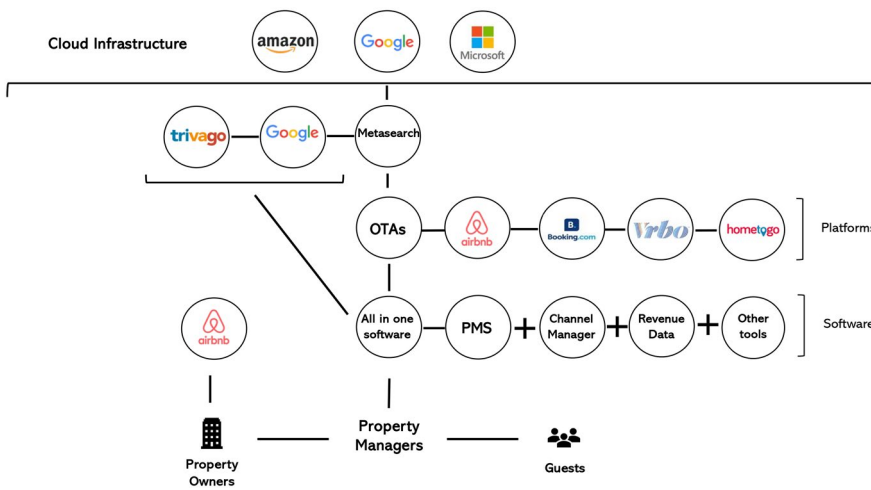

Figure 2. STR digital infrastructure.
Source: own elaboration.

that actively structures market participation. The figure visualises how professional STR supply is funnelled through a set of software tools and platforms that mediate access to demand, coordinate multi-channel distribution, and translate everyday rental operations into standardised data streams. The infrastructure functions as an obligatory passage point, insofar as professional property managers cannot realistically operate at scale without passing through it. Visibility on major platforms, synchronisation of availability, or price optimisation are no longer achievable through direct platform use alone. Instead, they require integration into the software stack depicted in Figure 2, which becomes the practical interface through which the market is accessed and governed. For professional actors, decision-making increasingly takes place at the level of the dashboard rather than the platform interface.

The implications of this data-generating infrastructure vary across market actors. Professional property managers occupy a particularly strategic position because they operate at the intersection of the platform and software layers of the STR ecosystem. Research shows a process of market concentration in which these actors have been backed by venture capital to expand globally, seeking both to build international brands and to consolidate control over the infrastructural layer through which data flows are produced and aggregated (Cocola-Gant et al., 2021). In many cases, this has involved large property managers developing their own software solutions or partnering with technology providers, thereby gaining privileged access to operational data and analytical capabilities. This positioning makes property managers key intermediaries in accessing and interpreting market information, functioning not only as operational managers but also as knowledge brokers. Several studies in different cities show that tech-driven property managers increasingly play a role in informing housing investors and guiding investment decisions, with portfolio expansion often driven by the return expectations derived from such data (Jover & Cocola-Gant, 2023; Cocola-Gant, Hodkinson & Janoschka, 2025).

Market data: the Idealista case in Southern Europe

The importance of accessing the infrastructure and controlling market data is further illustrated by the interest it attracts from other actors. A clear example of this dynamic is Idealista, one of the leading online real estate marketplaces in Spain, Portugal, and Italy. At first glance, Idealista appears to operate primarily in the long-term real estate market and does not directly distribute or manage STRs. However, in 2012 the company acquired Rentalia, a vacation rental listing site founded in 2002 that now hosts more than 40,000 listings across Southern Europe. Later, in 2019, Idealista expanded further by purchasing AvaiBook, a Spain-based all-in-one vacation rental management and distribution software launched in 2010. As a result, Figure 2 positions Idealista as having access to both

layers of the STR digital infrastructure: the platform level (through Rentalia) and the software level (through AvaiBook).

During our interview with the CEO of AvaiBook, he emphasised that Idealista's interest in controlling both Rentalia and AvaiBook is fundamentally about controlling data. Although STRs are not Idealista's core business, these acquisitions give the company access to valuable market information. As he explained:

> Idealista can now provide real estate agencies with detailed information about market trends and the profitability potential of each apartment. When agencies want to sell an apartment to an investor, they already know the opportunities available in the STR market. This is added value for Idealista: knowing how each asset can be exploited throughout the year.

As illustrated by both STR property managers and the Idealista–Rentalia–AvaiBook configuration, data generated through STR operations can be aggregated, standardised, and repurposed for market analysis and asset valuation. Control over this data-generating infrastructure becomes a source of market power, as it allows these actors to secure privileged access to real-time data flows, strengthening their capacity to influence market visibility and investment narratives. This process has important spatial implications, as it contributes both to the conversion of residential units into tourist accommodation and to the broader touristification of urban areas. The urban literature on Airbnb has extensively examined these spatial dynamics (Esposito, 2023; Ferreira et al., 2026; Roelofsen, 2018; Smigiel, 2024). Here we suggest that they should also be understood in relation to the growing role of data-driven infrastructures, through which properties are increasingly evaluated, compared, and traded according to calculative metrics of profitability.

Conclusions

This paper has redefined Airbnb as one element within a longer trajectory of technological and organisational innovation in hospitality and real estate, rather than the singular disruptor it is often portrayed to be. By tracing the sector's evolution from the 1960s to the present day, we have demonstrated that the key infrastructures that organise the sector, including property management systems, channel managers, APIs, and platform interdependencies, predate Airbnb and continue to influence the way in which STR markets operate. Adopting an infrastructural perspective (Helmond, Nieborg, & van der Vlist, 2019; Plantin et al., 2018; Plantin & Punathambekar, 2019; van Dijck, 2021; van Dijck et al., 2019) shifts attention away from individual platforms towards the broader assemblage of software systems through which market participation is organised. As competitive listing, multi-channel distribution and large-scale operation increasingly depend on interoperable software systems, STR digital

infrastructure generates systemic forms of dependence that bind professional operators to the ecosystem as a whole.

We argue that this organisation acquires infrastructural power because it increasingly functions as an obligatory passage point for professional market actors (Plantin et al., 2018; van Dijck et al., 2019). This shifts analytical attention away from individual platform-user interactions (i.e., Airbnb connecting hosts with guests) towards the wider distribution ecosystem through which market access is organised, including industry governance, and power. Competitive listing, multi-channel distribution and portfolio-scale management now depend less on any single platform than on integration into interoperable tools, such as channel managers, PMS and related software interfaces. Therefore, access to demand is not secured simply by participating in individual platforms alone, but by maintaining ongoing compatibility with the software systems and standards that coordinate distribution across them. This results in systemic dependence on the sector's digital infrastructure as a whole, rather than on Airbnb or one dominant intermediary alone.

This analysis also helps to position Airbnb more precisely within the political economy of STRs. While Airbnb undoubtedly contributed to the sector's expansion and visibility, it did not create its operational foundations from scratch. Earlier digital imaginaries suggested that the internet might sustain forms of digital commons (Schor, 2020), a horizon that Airbnb strategically repurposed through the language of the sharing economy. In practice, it was fuelled by venture capital and digital technology, while integrating professional players and, eventually, hotels. By doing so, it positioned itself as an alternative distribution channel, illustrating how capitalism reabsorbed digital utopias into rentier logics of accumulation (Törnberg & Uitermark, 2025). In this respect, rather than centring Airbnb as a monopolistic giant, the paper urges us to see it as embedded in an interdependent assemblage of OTAs, software providers, and digital intermediaries. Airbnb's initial vulnerability to losing professional property managers prompted a strategic shift towards deeper integration, including the release and expansion of APIs that allowed Airbnb to plug into existing software ecosystems. This shift can be understood as a process of infrastructuralisation, through which platform power increasingly depends on embeddedness within existing operational infrastructures rather than imposing proprietary systems from above. Viewed in this way, platform power in the STR market is not limited to monopoly control of the consumer interface (van Dijck, 2021).

The paper further suggests that control over this infrastructure is a source of market power because it enables privileged access to operational data. As Idealista's acquisitions demonstrate, the strategic value of digital intermediation lies not in facilitating transactions, but also in controlling the technical gateways through which listings, bookings, and performance data circulate. This data can then be aggregated and repurposed for market

analysis and asset valuation, thereby extending calculative and investment-oriented logics further into housing markets.

Finally, STR digital infrastructure should be understood as not only a mechanism for coordinating short-term rental activity, but also as inter-sectoral infrastructure for converting between rental regimes. By linking short-, mid-, and long-term rental markets through interoperable software systems, it makes housing more calculable, tradable and fluid. Properties can be reallocated with growing ease according to shifting expectations of profitability. This capacity to operationalise fluidity constitutes an important form of infrastructural power, expanding strategic flexibility for property owners and managers, while increasing insecurity for tenants and complicating regulatory efforts at governing specific segments of the housing market. Therefore, understanding STRs through the lens of digital infrastructure helps to explain not only how this market is organised, but also how contemporary forms of platformed housing reshape cities through data, interoperability, and the continuous reordering of residential use.

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